

IS FLOODING GETTING WORSE IN THE PASSAIC-HACKENSACK WATERSHED? A HISTORICAL, EMPIRICAL ANALYSIS OF TEMPORAL TRENDS IN FLOOD FREQUENCY AND MAGNITUDE

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Flooding is a severe and reoccurring problem throughout New Jersey, including the Hackensack and Passaic River basins. There seems to be a popular perception that flooding is getting worse, that is, flooding is becoming more frequent and/or more extreme. To see if this is indeed true, we calculated flows associated with various frequencies of occurrence (i.e., the 2, 5, 10, 20, 50 and 100-year flows) for 18 USGS-operated stream flow gages in the basins (with periods of record ranging from 50 to 108 years) for successive 30-year blocks of measured annual peak discharges, starting from the beginning of each record. Out of the 18 gages, the number and percent of gages that showed a statistically significant linear increase (F-test p-value <0.05) in flow through time were as follows: 14 (78%) for the 2-year and 5-year flow; 13 (72%) for the 10-year and 20-year flow; 12 (67%) for the 50-year; and 10 (56%) for the 100-year flow. Three of the gages that did not show significant increases are located immediately downstream of reservoirs, which are well known to decrease flood flows. Only one station showed a statistically significant decrease and for only one return period -- the 100 year flow on the Passaic River at Little Falls. The median rate of increase for stations with significant increases (relative to the flow for the corresponding return period for a gage's entire record) was 1.1% per year for the 2-year flow and 0.7% per year for the 100-year flow. According to this analytical method, it appears that flood flows have indeed increased through time at a majority of stream flow gages in the Passaic-Hackensack Watershed.